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MARKED-UP SET OF CLAIMS 5-18
INCLUDING REFERENCES TO TEXT
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Claim 5. (New) An image manipulating system, comprising:

an A/D converter for converting an analog video signal into a digital signal (ref. *1; Fig. 1, element 11);

a coder for compressing image data from the A/D converter (ref. *4; Fig. 1, el. 13b);

an interface circuit for recording the image data compressed by said coder in a removable recording medium employed as an image file (ref. *2, Fig. 1, el. 19) and coupled to said interface circuit;

a memory for storing a value, said value being incremented responsive to recording of an image file in said recording medium, said memory retaining said stored value even when the recording medium is uncoupled from said interface circuit and/or replaced (refs. *13, *14, *15) with another recording medium;

a controller for automatically producing a file name including a number when an image file is recorded in a recording medium coupled to said interface circuit, said controller selectively executing one of a first file name production mode to set a number in the file name to a selectable smallest one based on information recorded in the recording medium coupled to said interface circuit and a second file name production mode to provide a number in the file name based on the value stored in said memory (refs. *5, *6, *7, *10, *11, &12, *13); and

a mode selector for selecting one of said first file name production mode and said second file name production mode (ref. *8).

Claim 6. (New) An image manipulating system in accordance with claim 5,

wherein said mode selector comprises a switch to select one of the first and second modes (Fig. 1, el. 16).

Claim 7. (New) An image manipulating system in accordance with claim 5,

wherein the mode selector comprises a display for displaying a menu having selectable recording modes (Fig. 1, el. 17).

Claim 8. (New) An image manipulating system in accordance with claim 5,

wherein said controller retrieves directories having no recorded image file responsive to recording of an image file in the recording medium coupled to said interface circuit when executing said first file name production mode to record said image file in a directory having a smallest directory number and having no recorded image file and use said smallest directory number as a number in the file name, to thereby set the number in the file name to the selectable smallest one (refs. *6, *12).

Claim 9. (New) An image manipulating system in accordance with claim 5,

wherein said controller records an image file in a directory of a smallest directory number other than directories in which image files have been recorded or deleted responsive to recording of an image file in the loaded recording medium when executing the first file name production mode, and uses the number of this directory as a number in the file name, to thereby set the number in the file name to a selectable smallest number (refs. *7, *12).

Claim 10. (New) An image manipulating system in accordance with claim 5,

wherein said controller further provides a fixed character as part of the file name when automatically producing a file name (ref. *13).

Claim 11. (New) An image manipulating system in accordance with claim 5,

wherein said controller further provides a character specific to said system as part of a file name when automatically producing a file name (ref. *14).

Claim 12. (New) An image manipulating system in accordance with claim 5,

wherein said memory is capable of retaining stored data even when power to said memory is turned off (ref. *3).

Claim 13. (New) An image manipulating system in accordance with claim 12,

wherein said memory is an EEPROM (ref. *3).

Claim 14. (New) An image manipulating system, comprising:

an A/D converter for converting an analog video signal into a digital signal (ref. *1);

a coder for compressing image data from said A/D converter (ref. *4);

an interface circuit for recording image data compressed by said coder in a recording medium releaseably coupled to said interface circuit and employed as an image file (ref. *2);

a memory for storing a value, said value being incremented responsive to recording of an image file in the recording medium releaseably coupled to said interface circuit, said memory retaining said stored value even when said recording medium is decoupled from said interface circuit and exchanged for a second recording medium (refs. *13, *14); and

a controller (Fig. 1, el. 14a) for automatically producing a file name including a number when recording an image file in said recording medium, said controller

producing said number in the file name based on said value stored in the said memory.

Claim 15. (New) An image manipulating system in accordance with claim 14,

wherein said controller further provides a fixed character as part of the file name in automatically producing the file name (ref. *13).

Claim 16. (New) An image manipulating system in accordance with claim 14,

wherein said controller further provides a character specific to said system as part of the file name when automatically producing the file name (ref. *14).

Claim 17. (New) An image manipulating system in accordance with claim 14,

wherein said memory is capable of retaining stored data even when power to said memory is turned off (ref. *3).

Claim 18. (New) An image manipulating system in accordance with claim 17,

wherein said memory is an EEPROM (ref. *3).

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[0026] FIG. 17 is a flowchart showing the subroutine Empty Directory Retrieval 2 called by the subroutine Empty Directory Number Retrieval in FIG. 15;

[0027] FIG. 18 is a flowchart showing the subroutine File Name Automatic Production called by the subroutine Recording in FIG. 14;

[0028] FIG. 19 is a flowchart showing the subroutine File Name Automatic Production 1 called by the subroutine File Name Automatic Production in FIG. 18;

[0029] FIG. 20 is a flowchart showing the subroutine File Name Automatic Production 2 called by the subroutine File Name Automatic Production in FIG. 18;

[0030] FIG. 21 shows an example of a menu screen for interval recording in the image recording/reproducing system in FIG. 1;

[0031] FIG. 22 is an explanatory diagram concerning dual-screen displaying involving VRAMs in the image recording/reproducing system in FIG. 1;

[0032] FIG. 23 shows an example of dual-screen display in the image recording/reproducing system in FIG. 1;

[0033] FIG. 24 shows an example of a menu screen for file name automatic production in the image recording/reproducing system in FIG. 1; and

[0034] FIG. 25 is a side view showing a battery-like conductor loaded together with another power supply applicable to the image recording/reproducing system in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0035] An embodiment of the present invention will be described in conjunction with the drawings.

[0036] FIG. 1 is a block diagram showing a structure of an image recording/reproducing system, which acts as an image manipulating system of an embodiment of the present invention, with a remote-control transmitter and others connected.

[0037] Types of recording media applicable for image information to a recording/reproducing system 1 include, as shown in FIG. 1, a memory card 3, a floppy disk (FD in FIG. 1) 5, and a hard disk 20 (HD in FIG. 1).

[0038] The image recording/reproducing system 1 of this embodiment comprises an A/D converter 11 for converting a supplied analog video signal into a digital signal to be written in a video RAM (hereinafter, VRAM) 13c, a D/A converter 12 for outputting a video signal to a monitor or the like, an image data memory 13 having the built-in VRAM 13c, data/address buses 22 and 23, a video bus 24, a recording/reproducing control unit 14, a remote-control light receiver 15 for receiving infrared light transmitted from the remote-control transmitter 2 and outputting the transmitted signal to a CPU 14a, operation switches 16 that comprise switch buttons arranged on a front panel 1a (See FIG. 2) of a main unit of the system, a display 17 composed of LEDs for indicating operational states of the recording/reproducing system 1 and arranged on the panel 1a, an RS232C interface (I/F in FIG. 1) 18 that is a serial interface circuit connected to the modem 4, a memory card interface (I/F in FIG. 1) 19 that is a memory card interface circuit connected to the memory card 3, a hard disk drive unit 20, a floppy disk drive unit (FDD in FIG. 1) 21, batteries 25 realizing a power supply of 9 VDC or 5 VDC, and a voltage regulator 26.

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[0039] The foregoing data/address buses 22 and 23 serve as signal transmission buses linking between the memory card interface 19 and the control unit 14, and between the control unit 14 and the RAM-A 13a in the image data memory 13, D/A converter 12, and A/D converter 11.

[0040] The video bus 24 serves as a video signal transmission bus connecting between the VRAM 13c in the image data memory 13 and the D/A converter 12 or A/D converter 11.

[0041] The recording/reproducing control unit 14 controls circuit elements constituting the system and inputs a signal sent from the remote-control light receiver 15 and the output signals of the operation switches 16. The recording/reproducing control unit 14 comprises the CPU 14a having a built-in interval recording means and being responsible for control, a CG circuit 14b for outputting character data to be superposed on a video signal, a RAM-B 14c for storing data temporarily, a ROM 14d for storing various control algorithms, an EEPROM 14e for storing various data including recording time intervals for interval recording so as to make the data available with power off, and a floppy disk drive controller (FDC in FIG. 1) 14f for controlling the floppy disk drive 21.

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[0042] The image data memory 13 comprises the RAM-A 13a into which image data is fetched temporarily via the data/address bus 23 or a coder 13b to be described later, the coder 13b for compressing or decompressing image data, and the VRAM 13c into which a video signal is fetched via the video bus 24 or coder 13b.

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[0043] FIG. 2 shows a layout of the switch buttons of operation switches 16, LED indicators 17, and slots 1b and 1c with eject buttons, into which the memory card 3 and floppy disk 5 are loaded, on the front panel 1a of the image recording/reproducing system 1.

[0044] Buttons and indicators arranged on the panel 1a except for the slots 1b and 1c for loading recording media are a POWER switch 16z that is a power switch button, a Disp switch 16w that is a character display switch button, a Set switch 16x that is a switch button for setting conditions for, for example, compression or non-compression of image data, an LED display 17e for displaying a frame number to be reproduced or recorded, a Card/FD/HD switch 16r that is a switch button for selecting a type of recording medium, an LED array 17f for indicating a selected type of recording medium, and an Up switch 16s for designating "upward," a Down switch 16u for designating "downward," a Right switch 16v for designating "rightward," and a Left switch 16t for designating "leftward," which are general-purpose arrow select switch buttons.

[0045] Also arranged on the front panel 1a are a transfer direction indication LED array 17g for indicating recording media acting as a source and destination of image data to be copied, LED indicators for indicating conditions for compression and non-compression of image data; that is, Fixed 1 and Fixed 2 indicators 17a and 17b for indicating compression under fixed 1 and 2 conditions, a Variable indicator 17c for indicating variable length compression, and a Non-compression indicator 17d for indicating that compression is not performed, a Copy switch 16a that is a switch button for copying image data of one screen into a recording medium, an All Copy switch 16b that is a switch button for copying all image data from one recording medium into another recording medium, a Format switch 16c that is a switch button for formatting a recording medium, an Erase switch

sub-screen or left sub-screen. Thereafter, the Right switch 16r or Left switch 16l is turned on or off, so that the right or left sub-screen can be scrolled to display any division of one screen in full size. Consequently, the right and left sub-screens, especially, areas near a boundary or ends of both the sub-screens can be compared with each other effortlessly. In this system, a screen is divided laterally. The present invention is not limited to this working mode but may apply to vertically-divided multi-screen display or division display providing two or more sub-screens.

[0084] Subroutine Recording, which is called at step S52 in subroutine IntRec shown in FIG. 6, at step S74 in Copying initiated at branch B5 in FIG. 7, or during normal recording, will be described in conjunction with the flowchart in FIG. 14.

*5 *6 [0085] In the Recording subroutine, a directory to be recorded is selected automatically. First and second recording modes are available. In the first recording mode, all directories including those from which image data are deleted are searched to retrieve directories that do not have recorded image data. A directory having the smallest directory number is then specified. The first recording mode enables effective use of directories. In the second recording mode, a directory succeeding a directory number of a directory in or from which image data has been recorded or deleted last is specified. Deleted directories are wasted. However, the second recording mode enables recording in order of specification.

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[0086] A flag R1 which will be described later is adopted as a means for selecting the first or second recording mode. For example, a value set for the flag R1 is stored in a recording medium, and a recording mode is specified by reading the value. Alternatively, a display screen for recording mode selection may be displayed successively to the menu screen G1 in FIG. 21. While the screen is being viewed, switches are pressed to change the value set for the flag R1. Thus, a recording mode may be designated. As for a flag R2 used in file name automatic production which will be described later, similar to the flag R1, a value stored in a recording medium may be read out or a value may be designated and entered in a screen.

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[0087] The Recording subroutine will be described more particularly. First, at step S131 in FIG. 14, subroutine Empty Directory Number Retrieval for retrieving a directory in a recording medium, in which image data is to be recorded, is called.

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[0088] The subroutine checks, as shown in FIG. 15, the flag R1 at step S141. If the flag R1 is set to 1, control is passed to step S142 Subroutine Empty Directory Retrieval 1 is called to retrieve a directory to be recorded in the first recording mode. If the flag R1 is reset to 0, control is passed to step S143. Subroutine Empty Directory Retrieval 2 is called to retrieve a directory to be recorded in the second recording mode.

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[0089] The Empty Directory Retrieval 1 subroutine runs according to the flowchart in FIG. 16. At step S151, 1 is set for the designated directory number RN. At step S152, it is checked if the RN-th directory has been recorded with image data. If it is determined that the RN-th directory has not been recorded, control is passed to step S153. An empty directory number is specified as RN. The subroutine then terminates.

[0090] When it is found at step S152 that the RN-th directory has been recorded with image data, control is jumped to step S154.

[0091] At step S154, the RN value is incremented. Control is then passed to step S155. It is checked if the RN value agrees with the maximum number of frames recordable in a recording medium; that is, the maximum number of directory entries RNmax. If they disagree, control is returned to step S152. If they agree, control is passed to step S156 or S157. It is then determined that an empty directory is unavailable. CARD FULL is therefore displayed. The subroutine then terminates.

*11 [0092] The Empty Directory Retrieval 2 subroutine runs according to the flowchart of FIG. 17. At step S161, the designated directory number RN is set to a value representing the maximum directory number RNmax. At step S162, it is checked if the RN-th directory has been recorded with image data. If the RN-th directory has been recorded, control is passed to step S163 or S164. It is then determined that an empty directory is unavailable. CARD FULL is therefore displayed. If it is determined at step S162 that the RN-th directory has not been recorded, control is passed to step S165.

[0093] At step S165, the RN value is decremented. Control is then passed to step S166. It is checked if the RN-th directory has been recorded with image data. When it is found that the RN-th directory has been recorded, it is determined that all directories ending with the RN-th directory have been recorded image data. Control is then jumped to step S167. RN+1 is specified as an empty directory number. The subroutine then terminates. When it is found at step S166 that the RN-th directory has not been recorded, control is passed to step S168. It is then checked if the RN value is 1. If the RN value is 1, it is determined that all directories have been checked and not been recorded with image data. 1 is then set for the directory number RN. The subroutine then terminates. When the RN value is not 1, control is returned to step S165.

[0094] Step S131 in subroutine Recording in FIG. 14 is succeeded by step S132. At step S132, subroutine File Name Automatic Production is called.

[0095] FIG. 18 is a flowchart showing the File Name Automatic Production subroutine. The subroutine runs under the control of a means incorporated in the recording/reproducing control unit 14 and designed to assign a file name. During file name production, part of a file name is defined as arbitrarily non-designative and therefore specified automatically, while the other part is defined as arbitrarily designative.

[0096] First, at step S171, a medium is checked for a value set for the flag R2. If the value is 1, control is passed to step S172. If the value is 0, control is passed to step S173. Subroutine File Name Automatic Production 1 or File Name Automatic Production 2 is then run.

[0097] The File Name Automatic Production 1 subroutine runs according to the flowchart in FIG. 19. At step S181, fixed characters, for example, DFS are specified as the first to third leftmost characters of a file name. At step S182, a character specific to the system, for example, A is specified as the fourth leftmost character thereof.

Amendment
[B](b)

[0098] The characters can be designated in a menu screen G3 shown in FIG. 24. That is to say, the first line in the menu screen G3 is displayed in red. The character A is changed to B, C, or the like, whereby the fourth character is designated.

*12 [0099] At step S183 succeeding S182, an automatically specified directory number, for example, 0036 is specified as the fifth to eighth characters. Next, at step S184, the characters specified at steps S181 to S183 are combined to produce a file name. The foregoing example provides DFSA0036.XXX. Note that XXX denotes a subordinate name of the file name.

[0100] As mentioned above, in subroutine File Name Automatic Production 1, a file name includes a directory number of a directory associated with the file. For copying image data, the system autonomously appends a directory number to a file name. An operator therefore need not rename a file name. Furthermore, an accident that an old file having the same name as a new file is deleted will not occur.

[0101] The File Name Automatic Production 2 subroutine runs according to the flowchart of FIG. 20. At step S191, it is determined that a copy mode is designated. If the copy mode is designated, control is jumped to step S197. The subroutine is terminated without any change in a file name. If the copy mode is not designated, control is passed to step S192. Fixed characters, for example, DFS are specified as the first to third leftmost characters of a file name. At step S193, a character specific to the system, for example, B is specified as the fourth leftmost character thereof. At step S194, a value of a serial file number RM stored in the EEPROM 14e, for example, 0063 is specified as the fifth to eighth leftmost characters thereof. At step S195, the value of the serial file number RM is incremented. At step S196, the characters specified at steps S192 to S194 are combined to produce a file name. The foregoing example provides DFSB0063.XXX. Note that XXX denotes a subordinate name of the file name.

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(Amended)

[0102] As mentioned above, in subroutine File Name Automatic Production 2, even when a plurality of systems of the same kind are installed, since any of the systems is distinguished from another with the fourth character of a file name, the systems can be differentiated from one to another. Moreover, since part of a file name is a serial file number stored and managed in the EEPROM 14e and associated with the file concerned, even if a medium is exchanged for another, a duplicate number will not be created within four characters. When image data is copied, therefore, a file name need not be renamed. A file having a duplicate name will not reside. This means that image data in an old file having the same name as a new file will not be deleted.

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[0103] The serial file number RM may be defined with data produced by manipulating values of a year, date, time, minute, and second. The serial file number may be reset to 0s with the second line in the menu screen G3 in FIG. 24 displayed in red.

[0104] Next, a power supply for the system will be described.

[0105] The power supply 25 is composed of batteries. More particularly, six manganese batteries each generating a rated voltage of 1.5 V are connected in series with one another and stowed in a battery casing to constitute a power supply for inputting 9 VDC to the regulator 26. Five lithium batteries each generating a rated voltage of 1.8 V, for example, can be used as alternative batteries. In this case, the power supply accommodates one battery-like conductor 27 shown in FIG. 25 as a dummy battery. Since five 1.8 V batteries are connected in series with one another, the power supply inputs 9 VDC to the regulator.

[0106] The battery-like conductor 27 has a first conductive part 27a acting like a positive terminal of a battery and a second conductive part 27b acting like a negative terminal thereof and conducting substantially to the first conductive part. When batteries of another specification, for example, lithium batteries are employed, five lithium batteries and one battery-like conductor 27 are connected in series with one another, so that the supply voltage of the lithium batteries becomes substantially equal to that of six manganese batteries connected in series with one another. Thus, the battery-like conductor helps avoid malfunction due to overvoltage or undervoltage, or prevent circuits from destroying.

[0107] As described so far, an image recording/reproducing system serving as an image manipulating system of this embodiment identifies an adopted type of recording medium, sets a recording time interval for interval recording within a range allowed by a ruling means, and then executes interval recording. A recording time interval can be selected depending on a type of information recording medium. Interval recording can therefore be achieved in as strict compliance as is possible responsive to a demand. This results in a user-friendly system.

What is claimed is:

1. An image manipulating system comprising:

a memory device; and

a file name generator for assigning a file name for information to be recorded so that said information can be formatted as a file and then stored in a recording medium,

wherein:

said file name generator automatically assigns the file name with a part of the file name comprised of a serial number stored and managed in the memory device and associated with the file concerned.

2. An image manipulating system in accordance with claim 1, wherein said file name generator increments a serial number assigned to the file name and stores the incremented file number for subsequent use.

3. An image manipulating system in accordance with claim 1 wherein:

said file name generator further includes apparatus for providing characters forming an arbitrary portion for the file name; and

apparatus for combining the arbitrary portion with said file number.

4. An image manipulating system in accordance with claim 1 wherein:

said file name generator includes apparatus for including a character identifying said system with the file number.

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